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Fungal nomenclature 3. A critical response to the 'Amsterdam Declaration'

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Abstract — Numerous taxonomists and monographers of fungi are objecting an enforced unitary nomenclature for ascomycetes and basidiomycetes. Proposals 297 and subsequent ones by Redhead et al. (2010) and the "Amsterdam Declaration" (AD) demand more or less drastic and not necessarily efficient changes into this direction.

Three groups of arguments in the AD are refuted: 1. The identification of organisms exclusively based on gene sequences is prone to errors and only a minority of the named fungi has been thoroughly studied so far with molecular methods. 2. There is no need for a mycological Code separate from the botanical one. Where taxonomy demands, special rules for Fungi have already been defined. The registration of taxonomic novelties required for valid publication is supported, but without MycoBank being entitled to make taxonomic statements. 3. Deletion of Article 59 is not possible without chaotic consequences. The mechanism of teleotypification alone does not lead to phylogenetically supported genera. Even after introducing a 'one fungus – one name' rule, mycologists will need to understand the so far prevailing system of dual nomenclature when screening the taxonomic literature.

Objections to the recommendations of the AD include: A selection of generic names among either teleomorph-typified or anamorph-typified genera according to priority contravenes the time-honored rule of precedence of teleomorph-typified names and would make many crucial teleomorph genera unavailable. – A rule that mycologists, who first choose the generic name to be adopted, would have to be followed and this choice has to be registered will be a serious source of conflicts among mycologists. – More weight will be given to the ICTF, an organization dealing mainly with economically important fungi. We maintain that questions of fungal nomenclature must continue to be handled by the Nomenclature Committee for Fungi (NCF)

Key words — Dual nomenclature, anamorph–teleomorph connection, precedence of teleomorph name, registration in databases

In the era of molecular research we see great progress in the phylogenetic delimitation of species, genera and higher taxa. Taxonomic progress inevitably leads to name changes but their limitation to a minimum is a major goal of

* Full list of signatories and addresses begin on page 509

good nomenclature, adhering to rules that are democratically established in the International Code of Botanical (and Mycological) Nomenclature (ICBN). Mycologists often emphasize the possibility to characterize every fungus in its phylogenetic position, although this has been realized only for a minority of named fungi. As a consequence, many mycologists wish to move towards recognizing only one name unequivocally tied to each fungus, even if the fungus expresses itself in different morphs, for which so far different names have been allowed under Article 59 of the ICBN. We try to analyze the feasibility of such a move without major nomenclatural destabilization.

Recently mycologists convened at the CBS Symposium One Fungus – One Name (1F = 1N) in Amsterdam on 19–20 April 2011, and the ensuing Amsterdam Declaration (Hawksworth et al. 2011, addressed below as AD) speak of an urgent need of action in moving towards one name for pleomorphic fungi.

The AD bears an impressive number of authors or supporters. But many mycologists did not know about the 1 F = 1 N meeting or did not have the chance to participate. A general major objective of all of us still is stability in fungal nomenclature. But are we getting one step further towards this goal? We rather feel that the stability of names is at risk. The AD pretends that its main aim is to support independence of mycology (or rather mycological institutions) from other disciplines, an intention shared by most mycologists. However, the declaration entails many substantial changes in fungal nomenclature without providing clear, transparent and fair rules for solving nomenclatural problems.

Our objective: A considerable fraction of the Mycological Community disagrees with provisions published in the AD. We also object to Redhead's proposal 297 (Taxon 59: 1927–1929, 2010) and following ones (In the Summary of Proposals in Taxon 60: 243–286, 2011, renumbered Art. 59-D)[1]. The following text was conceived as a reaction on the preliminary version of the AD from 9 May 2011, but the final version has not changed much of its gist. In this response we summarize the lowest common denominator of opinions expressed by the undersigned.

Premise: The separate naming of different morphs of pleomorphic fungi has been regulated by Art. 59 of the ICBN. This system has been working satisfactorily for both mycologists and their clients for many decades, providing considerable stability of names and flexibility in their use. In controversial cases, conservation is the tool of choice to solve problems.

[1]N.B. We do not wish to oppose all of Scott Redhead's proposals. On the contrary, some proposals like 306 (Chapter VI-A), 294 and 295 (Art. 9-V and W), 296 (Art. 59-C), 299 (F) and 303 (J) (with minor modification) are valuable improvements.

The authors of the AD justify their declaration primarily with the following arguments:

1) Molecular data allow to assign each fungus its phylogenetic place and to recognize monophyletic units.
2) Support by nomenclature sessions and a vote on the questionnaire at IMC9 in Edinburgh (Norvell et al. 2010), and expectations on a possibly forthcoming BioCode.
3) Impatience of some mycologists with the current wording of Art. 59 of the ICBN.

Considering these premises, the AD is too far-reaching, too radical and not practical

Ad 1—Molecular data/ DNA sequences. Many concerns have been raised about this topic. In its extreme, the AD seems to suggest that the characterization of a fungus is reduced to one or several DNA sequence(s). Another highly topical issue is the question whether the name tags attached to sequences truly represent the fungus in question. There is considerable chaos among sequences in GenBank, which reduces their value for the identification of fungi. Approximately 20% of entries in GenBank are based on wrongly identified species (Nilsson et al. 2006). Proposals to mend this situation are only gradually developing (Ozerskaya et al. 2010). The common belief that ITS sequences are suitable to identify species in fact might only be correct in about 50% of species (Nilsson et al. 2008). Given that less than 20% of the described fungal species are represented in GenBank and that described species might comprise only 5–10% of the global fungal diversity (Hawksworth 2004), tying present nomenclature to this poor base of data is obviously premature.

While the identification of organisms exclusively based on gene sequences is prone to error, this situation is a serious issue in the recognition of correct relationships of different stages of pleomorphic fungi. It questions the fundamental basis of the move to one name.

Moreover, only a minority of the named fungi has been sufficiently characterized and generic delimitation for holomorphic and for anamorphic fungi is strongly lagging behind, so that coordinated genera can by no means be declared each other's synonyms.

Ad 2—Votes on the questionnaires at the IMC9. At IMC7 a quite representative number of mycologists, assembled in a well-prepared session, opted against a move towards one name for pleomorphic fungi. The vote at IMC9 was cast by a rather arbitrary selection of Congress members (recovery rate: about 10%) and may have been less representative (Norvell et al. 2010). Even if we accept it, the vote was for a gradual move, whilst the AD formulates

a radical way that is by no means supported by that vote.

a) Abandoning dual nomenclature: Only 51 % of the IMC9 vote would reject a system that allows dual nomenclature for anamorphs and teleomorphs to continue via Art. 59, while 62% would decline validity of names for different morphs of the same species in the future via modifications of existing Articles. This is inconclusive.

b) A separate Code, "BioCode" or "MycoCode" is propagated by the AD. No mandate was given for this at IMC9. 71% approved the continuation of covering fungi under the ICBN provided it is renamed the "International Code of Botanical and Mycological Nomenclature" (ICBMN) and explicitly 61% rejected a separate mycological Code ("International Code of Mycological Nomenclature", MycoCode).

While a considerable number of mycologists would support a MycoCode in recognition of the importance of the kingdom Fungi, the inherent problem is a practical one, the lack of capacity. There are far too few nomenclature and taxonomy specialists in mycology. Who will administer and maintain such a Code?

It is crucial to distinguish nomenclature from taxonomy. The fact that Fungi form a separate group need not lead to the consequence that they would require different rules for naming members of that group (except where taxonomy demands, a fact that is already granted by Articles 13, 15 and 59 in the ICBN).

The problems debated here can and must therefore be solved in the frame of the ICBMN.

c) MycoBank: The IMC9 vote clearly supports making the deposition of key nomenclatural information in one or more approved depositories (e.g. MycoBank) mandatory for valid publication of new fungal names.

We support this, but the current practice of overruling registered names by a "MycoBank opinion" needs careful re-examination. Examples: *Chamaeleomyces viridis* is called a synonym of *Paecilomyces viridis*, and *Exophiala calicioides* a synonym of *Graphium calicioides* (instead of vice-versa). Otherwise, reasonable and transparent rules would have to be formulated for such a procedure. MycoBank is a name depository not entitled to make statements on taxonomy. For registration of new names, their protection as confidential before publication must be ensured in contrast to unfortunate cases where they became accessible contrary to the authors' intention.

d) Deletion of Art. 59 (ICBN): Though it is being stated in the AD as an action point of the future, the deletion of Art. 59 has not been

supported by the IMC9 vote (see the above comment a)). On the other hand, 73% of the votes support a system of progressively establishing one name for each fungus via modification of Art. 59.

Note that up to now, Art. 59 is permissive and not dogmatic about dual nomenclature, using the mechanism of precedence of teleomorph-typified names over anamorph names and recommending a self-restraint towards dual names. Proposal 297 and the AD would be dogmatic, declaring any additional morph-names illegitimate, whilst the current usage so far has been good mycological practice.

Ad 3—Teleotypification. This unusual kind of epitypification was somewhat imprecisely introduced in the Vienna Code (Art. 59.7); renaming this mechanism to "teleotypification" (Proposal 294) was then proposed. It has led some individuals to develop their own ideas and to deliberately infringe Art. 59. In our opinion, such individual actions should neither be taken as standard for the community nor as an argument for urgency.

It is still not clearly expressed in Proposal 297, whether a "teleotype" may be classified in an available, teleomorph-typified genus or not. Thus the proposal does not lead towards the ideal of one genus that comprises all phylogenetically congeneric species, no matter whether anamorphic or teleomorphic. The procedure adopted by Lombard et al. (2010) of transferring all purely anamorphic species of *Cylindrocladium* to *Calonectria* is not yet justified.

Practical consequences

For those who would have to implement the provisions made, the practical consequences of the AD are very important. However, they are not addressed in detail by the AD.

At present institutions generally tend to fill positions of taxonomists by people trained only in molecular techniques with no or little background in fungal taxonomy. What is needed is a recruiting of classically trained mycologists (Wheeler 2004), not only 'molecular people', to inventory the earth's biodiversity. Under these conditions the intents of the AD are bold, imposing substantial extra work on the ever-decreasing number of remaining taxonomists, who have to divert their energy and time from their principal tasks.

Implementation of the AD seems to impose the requirement of DNA sequences for every newly described taxon, which cannot be afforded by mycologists in developing countries, where the bulk of new discoveries is to be expected. It would preclude a good deal of the work that needs to be done no matter whether sequences can be obtained or not.

Taxonomists have a difficult job, as they need to consult literature of three centuries. Even after effectively introducing a one fungus–one name

nomenclature, anyone working with fungal names will need to understand the principles of dual nomenclature. A non-dual nomenclature will not simplify the understanding of the literature, which will have to be divided into a period with dual nomenclature and one with non-dual nomenclature. An implementation of the AD would presuppose the availability of specialists for every group of pleomorphic fungi who would have to take binding decisions.

Objections to the recommendations

We object to the following recommendations of the AD, because they are particularly problematic:

A) "*Follow the ICBN, except when it is contrary to the items below...*"

Our response: As long as there is no separate Code, the ICBN, including Art. 59, has to be strictly followed. We are convinced that the problems debated here can be solved within the frame of the ICBN and without recourse to other, possibly forthcoming codes. To encourage taxonomists to act as if Art. 59 were deleted and permitting additional exceptions that are not properly defined, will inevitably result in chaos.

B) "*Follow the Principle of Priority of publication of the ICBN when selecting the generic name to adopt ..., except where the younger generic name is far better known (in cases of doubt the appropriately mandated body should be consulted).*"

Our response: This move is diametrically opposed to the spirit of Art. 59. Moreover, the Principle of Priority of publication is mandatory not only at the generic but also at the species level. An implementation of such a recommendation would result in numerous new combinations and/or conservation proposals. According to priority at species level, numerous new combinations from teleomorph genus to anamorph genus (or vice-versa) will become necessary, or alternatively call for conservation. This would impose a cumbersome additional burden on taxonomists and on commissions and unnecessarily delay publications. One of the most telling examples is *Hypocrea lixii* with its widely recognized anamorph *Trichoderma harzianum*. Only a highly refined study tells that the two fungi are not the same species (Druzhinina et al. 2010).

A selection of the most suitable generic name among either teleomorph-typified or anamorph-typified genera according to priority contravenes the time-honored rule of precedence of teleomorph-typified names, which cannot be removed neither in its totality nor from a certain moment onward without distorting the present classification of ascomycete genera. To gain a taxonomic overview will be considerably impeded; many teleomorph genera will be abolished unless they are especially conserved.

To counteract this undesired effect, the AD suggests a bureaucratic

mechanism of registering preferred names, the effect of which seems doubtful to us.

Example 1: If an anamorph genus is older than the corresponding teleomorph genus, but certain epithets in the latter are older, described epithets in the anamorph genus need conservation, in case they are linked to taxa that are e.g. economically or medically important.

Comment 1: It is not shown what will happen if the generic type of the anamorph genus is different from the type of the claimed corresponding teleomorph genus and/or if type species remain unavailable for sequencing.

Comment 2: Who would support a replacement of the following genera, for example?

Leptosphaeria by *Phoma*

Nectria by *Tubercularia*

Pleospora by *Stemphylium* (Note: *Pleospora* is an integral component of the higher taxa *Pleosporaceae*, *Pleosporales*, *Pleosporomycetidae*.)

Hypocrea by *Trichoderma* (Note: *Hypocrea* is an integral component of the higher taxa *Hypocreaceae*, *Hypocreales*, *Hypocreomycetidae*, and some *Hypocrea* species do not have an anamorph at all.)

Comment 3: Who would decide on whether the younger generic name is being far better known? What are the selection criteria? Who will decide for the whole community and the users of names? Will the International Commission on the Taxonomy of Fungi (ICTF) overrule opinions of specialists?

c) "*Follow the author(s), or working groups of mycologists, who first choose the generic name to be adopted. Authors should consider it mandatory to register the choice in a recognized repository… and then be followed. However, in cases where the first selection appears not to be in the interests of most users of fungal names, a case to overturn the choice may be submitted to the appropriately mandated international body.*"

Our response: If a new body were mandated to approve and reject names, this would again mean confusion of taxonomy with nomenclature. Taxonomy is an empirical activity; what is true today can be wrong tomorrow. Nomenclature is a legal issue (no law is as retroactive as the ICBN) and it is dangerous if only the (self-appointed?) specialists act as guardians of nomenclature. Therefore, this recommendation will be a serious and dangerous source of conflicts among mycologists. It suggests that a selecting author is the first authority, but if someone else does not want to accept the decisions of that author, they can be overturned. In doing so, who will determine, which way is "in the interest of most users of fungal names"? Applying strictly one name for a pleomorphic fungus will mask errors, for example, when one of the names has been misapplied. Although not explicitly articulated, such cases are best handled by conservation proposals, a procedure already implemented in the ICBN.

D) "*Encourage individuals, or working groups of mycologists, to prepare lists of names to be preferentially used for any groups of fungi to be published (e.g. in Mycotaxon, IMA Fungus, or monographs), for endorsement by the ICTF or one of its Subcommissions.*"

Although lists may be beneficial, it may be difficult to find them, unless there is one central point of communication or storage that is supervised by competent taxonomists.

E) "*Note: The meeting felt that the ICTF … was probably the most "appropriately mandated body" for this task. It could then report its decisions to the Committee for Fungi for formal adoption under the ICBN.*"

Our response: We are concerned about the responsibility of the ICTF. The ICTF decidedly deals with particular, economically important, groups of fungi, therefore it does not represent objectively the entire mycological community with respect to fungal nomenclature. **Fungal nomenclature must continue to be represented by the Nomenclature Committee for Fungi (NCF).**

As a consequence of these deliberations, we urge the experts convened at the Nomenclature Section in the XVIII International Botanical Congress, Melbourne, July 2011, to vote against Prop. 297 and the following ones and against the implementation of the Amsterdam Declaration. These proposals only express one of the presently widely diverging opinions of the mycological community.

Finally, we most earnestly desire stability in fungal nomenclature, which eventually may move toward a unified nomenclature.

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